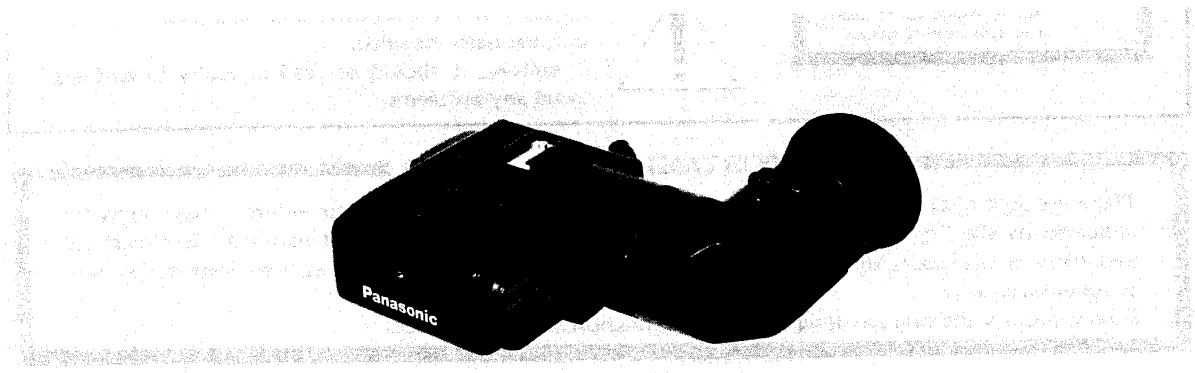
ORDER NO. AVS9005

Service Manual

1.5" Electronic Viewfinder

WV-VF39



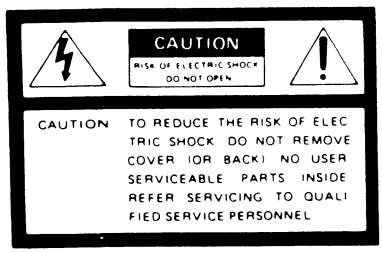
SPECIFICATIONS

Visual Size :	1-3/8" actual image size, measured diagonally
Power Source :	Supplied from camera head
Horizontal Resolution :	450 lines at center
Switches :	Tally ON/OFF
Controls :	Contrast, Brightness, Peaking
Display :	PAL composite
Indicator :	Level Indicator (zebra pattern) Character Display Tally Light
Dimensions :	192 (W) x 68 (H) x 189 (D) mm
Weight :	0.58 kg

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

Panasonic

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan



This symbol warns the user that uninsulated voltage within the unit may have suificient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by the " ⚠ " mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards.
Do not modify the original design without permission of manufacturer.

CIRCUIT DESCRIPTION

1. **Video Amplifier Circuit**
2. **Deflection Circuit**
3. **High Voltage Circuit**
4. **Indicator Drive Circuit**
5. **+8V DC Regulator Circuit**

1. Video Amplifier Circuit

This circuit receives the video signal from the EVF video output circuit in the Encoder board in the camera. The video signal is amplified and sent to the grid-1 (G1) of cathode ray tube (CRT).
The video signal at pin 1 of CN1 on the Video amp board is fed through buffer Q1 and VR1 (CONTRAST) to peaking circuit consisting of Q2 ~ Q4.
The video signal whose 4MHz portion is enhanced is then sent to grid-1 of CRT through SC trap/amplifier Q5 ~ Q7. The V blanking (BL) pulse obtained at the collector of deflection output Q14 are sent to Q9/Q10 where the V BL pulse and H BL pulse are mixed with the video signal for eliminating the retrace line on the CRT screen. The video signal is clamped with Q10 to the voltage set by VR6 (SUB BRIGHT) and VR5 (BRIGHT). By adjusting VR2 (PEAKING LEVEL), the frequency response at approximately 4MHz portion of video signal is increased for making optical focus adjustment of picture in the viewfinder easily.

2. Deflection Circuit

This circuit also generates horizontal (H) and vertical (V) deflection sawtooth current for horizontal and vertical scanning of beam inside the cathode ray tube (CRT) respectively.
The video signal obtained at pin 5 of CN2 on the Deflection board is applied through pin 11 of IC1 to sync separator which detects only the sync signal. The sync signal is then sent to the Horizontal Deflection Circuit.
The sync signal is also fed to integrator consisting of R19/C16 where the horizontal (H) sync is removed and only the vertical (V) sync remains. The V sync signal is fed through V. sync circuit to the Vertical Deflection Circuit.

- **Horizontal Deflection Circuit**

The H. sync pulse separated in IC1 is sent to AFC in IC1 where the H sync signal is compared with the H sawtooth signal which is generated from the H flyback pulse with integrator consisting of R7 and C7 and sent through pin 12 of IC1. The phase difference between two signals is converted into the DC potential and it is sent through pin 13 of IC1 to the voltage controlled oscillator (VCO) to control the oscillating frequency. As a result, the VCO oscillates the signal whose frequency and phase match to those of H sync signal. VR1 (H HOLD) is a control for setting the oscillation frequency in a steady state. The H pulse is then fed to H deflection output Q14 on the Video amp board through the H predrive circuit inside IC1 on the Deflection board and H deflection drive Q13 on the Video amp board. The H sawtooth current obtained at the collector of Q14 is supplied through pin 2 of CN2 on the Video amp board to the H deflection coil.
The flyback pulse obtained at the collector of Q14 on the Video amp board is sent to the high voltage circuit and the video amplifier circuit as a H blanking pulse.

- **Vertical Deflection Circuit**

The V sync pulse is fed to the V oscillator in IC1 to trigger it and the V oscillator oscillates the V sawtooth signal. The V sawtooth signal is then fed through V deflection drive circuit in IC1, and V deflection output Q8/Q9 on the Deflection board to the V deflection coil.

3. High Voltage Circuit

This circuit generates high voltages for cathode ray tube (CRT) electrodes.
The flyback pulse generated at the collector of Q14 in the horizontal (H) deflection circuit is supplied to primary winding of the flyback transformer (FBT) in the high voltage pack T1 on the Video amp board to step up the flyback pulse to necessary level. The boosted pulse obtained at the secondary winding of FBT are rectified to generate high voltages. +3.5kV obtained by rectifying the boosted pulse is fed to the CRT anode. +500V obtained at pin 1 of T1 is divided by VR4 (FOCUS) and R40 ~ R47. The DC voltage set by VR4 (FOCUS) is fed to grid-3 (G3) of CRT. +300V obtained at cross point of R56 and R57 is fed to grid-2 (G2) of CRT. 0.58V obtained at pin 3 of T1 is fed to heater of CRT through pin 2 of E2. .

4. Indicator Drive Circuit

This circuit lights/blinks ON and OFF the Auto warning, battery warning, high gain and shutter indicator and the recording/tally indicator in front of cathode ray tube (CRT) screen by the control signals supplied to this circuit.
When the High Gain Selection Switch on the side of camera is set to the +9dB or +18dB position, the low level is sent to Q5 turning it ON and the high gain indicator D3(b) on the LED board lights. When the DC voltage which is supplied to the camera from the battery becomes less than 10.6V, the pulse whose frequency is approximately 1Hz is fed to switching transistor Q3 to turn it ON and OFF. Therefore, the battery warning indicator D4 on the LED board blinks. When the automatic white balance or black balance is being set, the pulse whose frequency is approximately 2.5Hz is fed to switching transistor Q6 to turn it ON and OFF. Therefore, the

auto indicator D2 on the LED board blinks. If the automatic white balance or black balance is set improperly, the high level is fed to Q6 and D2 lights ON. When the camera is set to the recording mode by pressing the VTR Start/Stop switch, high level is sent to the base of Q7 and the recording/tally indicator D1 on the LED board and the tally light D1 on the Deflection board in front of viewfinder light. If the tally ON/OFF switch SW1 is set to the OFF position, D1 turns OFF.

5. +8.5V DC Regulator Circuit

+8.5V is generated by IC1 and Q12 and it is used as a power supply for the deflection circuit.

ADJUSTMENT PROCEDURE

1. Test Equipment Required

Following equipments are required for adjustment of WV-VF39.

- Color Video Camera (WV-F70, WV-F200A, WV-F250, WV-F300 (for only NTSC))
- Oscilloscope (Dual trace, More than 50MHz bandwidth, Delayed sweep)
- Digital voltmeter
- Color video monitor
- Resolution chart
- DC power supply (DC 12V, 3A or more)
- Lighting (200 footcandles (2000 lux), 3200°K)
- Camera adaptor

2. Disassembling Procedure for Adjustment

- Remove four screws which hold the EVF upper cover and remove the EVF upper cover by pulling it.

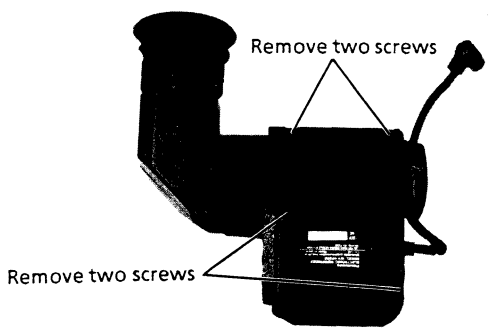


Fig. 2-1

- Remove three screws which hold the bottom CRT cover and remove the bottom CRT cover.

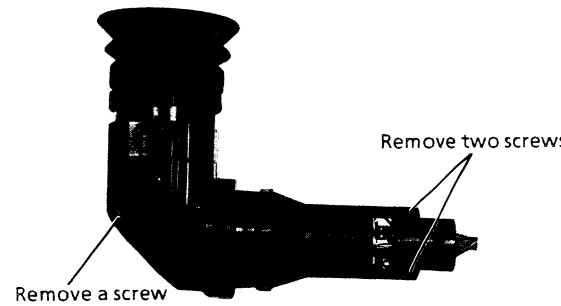


Fig. 2-2

3. Adjustment Procedure

3-1 Connection and Setting Up for Adjustment

- The camera must be completely aligned before viewfinder adjustment is made.
- Disassemble the 1.5" Viewfinder WV-VF39 while referring to "2. Disassembling Procedure for Adjustment".
- Connect the 1.5" Viewfinder WV-VF39 to the viewfinder connector on the camera head.

Connection

- Connect the coaxial cable between the VIDEO OUT connector on the right side (viewed from rear) of camera adaptor and the VIDEO IN connector of the color video monitor.
- Connect the coaxial cable between the VIDEO OUT connector of the color video monitor and VIDEO IN connector of the underscanned black and white video monitor.
- Terminate the video input of the underscanned black and white video monitor with 75 ohms.

Setup

- Turn on the camera for warm up at least 30 minutes prior to adjustment.
- Distance between the camera and test chart should be 3m.
- Lighting : 2000 lux, incident, 3200°K

Position of Controls and Switches on the Camera

<Left Side> Viewed from rear

- Filter Wheel 1
- High Gain Selection Switch ..... 0 dB
- Color Bar/Camera Selection Switch ..... CAM
- White Balance Selection Switch ..... P SET

- Power Switch ..... ON

<Inside Setup Panel>

- T PED ..... Center
- R GAIN ..... Center
- B GAIN ..... Center
- Electronic Shutter ON/OFF Switch ..... OFF
- Detail Level Selection Switch ..... OFF
- H PHASE ..... Center
- SC PHASE ..... Center
- Lens Iris Control ..... 11 o'clock
- Level Indictor ON/OFF Switch ..... ON

<Front>

- Auto White/Auto Black Set Switch ..... HOLD
- Lens Iris Selection Switch ..... NOR

<Right Side> Viewed from rear

- Power Selector Switch ..... BTT/EXTDC

<Lens>

- Iris Control Selection Switch ..... A (Auto)

Position of Controls and Switches on the 1.5" Viewfinder

BRIGHT ..... Center
CONTRAST ..... Center
Peaking ON/OFF Switch ..... OFF
Tally ON/OFF Switch ..... ON

3-2 Adjustment

(1) 8.5V adjustment

Test point : **TP4 (8.5V)** **Video amp board**
Adjust : **VR3 (8.5V)** **Video amp board**

- Connect the digital voltmeter probe to TP4.
- Adjust VR3 for 8.5V ± 0.02V.

(2) Centering magnets adjustment

Adjust : **Centering magnets**
Observe : **Viewfinder**

- Reduce the picture side using VR3 (V SIZE) and L3 (H SIZE) so that the entire raster is observed on the viewfinder.
- Aim the camera at the resolution chart.
- Adjust the centering magnets so that the raster comes the center of viewfinder screen.

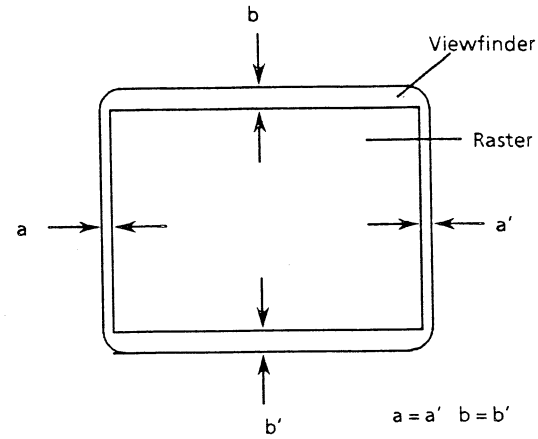


Fig. 3-2-1

(3) Picture tilt adjustment

Adjust : **Deflection coil**
Observe : **Viewfinder**

- Loosen the deflection coil holding screw.
- Observe the viewfinder and turn the deflection coil so that the raster is straight.
- Tighten the deflection coil holding screw.

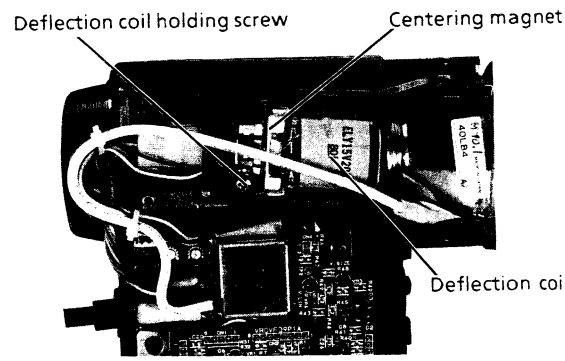


Fig. 3-2-2

(4) Horizontal hold adjustment

Test point : **TP1 (H. AFC)** **Deflection board**
Adjust : **VR1 (H. HOLD)** **Deflection board**
Observe : **Viewfinder**

- Connect the digital voltmeter probe to TP1.
- Adjust VR1 for 4.5V ± 0.05V.

(5) Vertical hold adjustment

Test points :	**TP2 (G1)**	**Video amp board**
	TP2 (V. DEF)	**Deflection board**
Adjust :	**VR2 (V. HOLD)**	**Deflection board**
Observe :	**Viewfinder**	

- Connect the oscilloscope to TP2 (G1) on the Video amp board and TP2 (V. DEF) on the Deflection board.
- Set the oscilloscope to V. rate and expand the vertical blanking period.
- Adjust VR2 so that the rising timing of waveform for TP2 (G1) on the video amp board positions at center of vertical sync period.

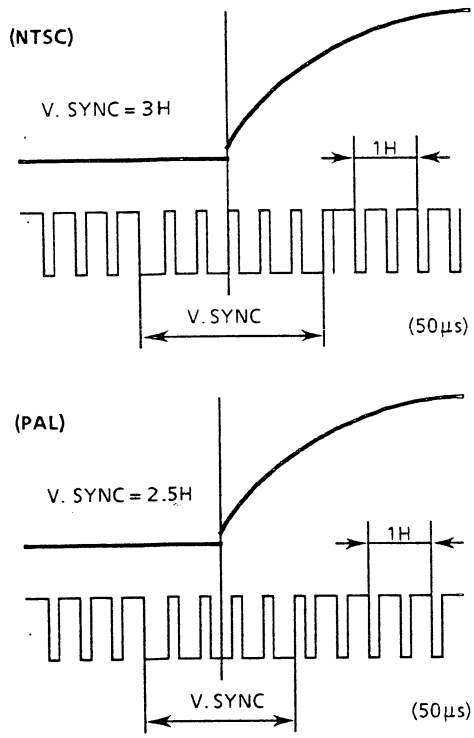


Fig. 3-2-3

(6) Horizontal and vertical size adjustment

Adjusts :	**L3 (H. SIZE)**	**Video amp board**
	VR3 (V. SIZE)	**Deflection board**
	VR4 (V. LIN)	**Deflection board**
Observe :	**Viewfinder**	

- Aim the camera at the resolution chart.
- Adjust L3 and stop just before horizontal edges of raster touching to the both edges of viewfinder screen.
- Adjust VR3 and VR4 so that the circle in the chart is really a true circle as possible.
- Confirm that the four corner of raster are observed on the viewfinder. If not, readjust the centering magnets.

(7) Subbrightness adjustment

Adjust :	**VR6 (SUBBRIGHT)**	**Video amp board**
Observe :	**Viewfinder**	

- Set VR6 (SUBBRIGHT) and VR1 (CONTRAST) to minimum and VR5 (BRIGHT) to its mechanical center.
- Turn VR6 back slowly and stop it at position where the raster on the screen just disappears.

(8) Focus adjustment

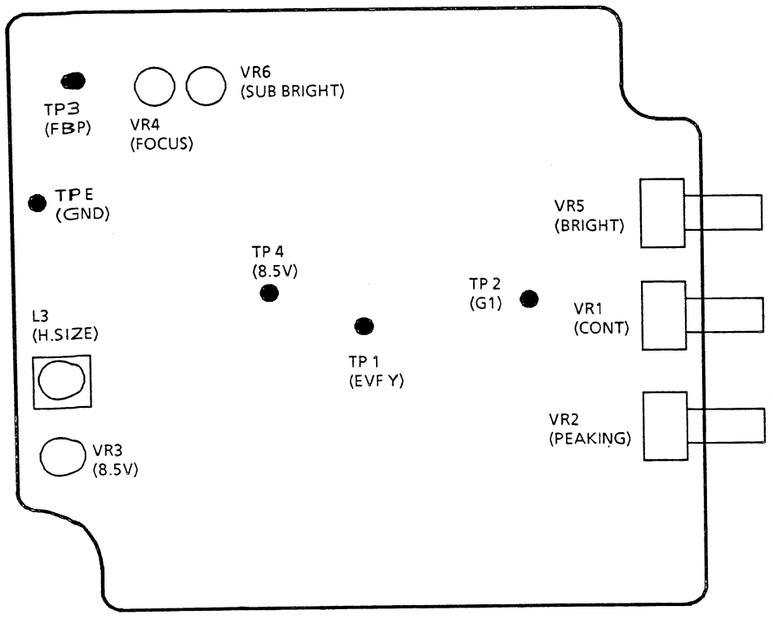
Adjust :	**VR4 (FOCUS)**	**Video amp board**
Observe :	**Viewfinder**	

- Aim the camera at the resolution chart.
- Adjust the lens focus for best resolution on the monochrome underscanned video monitor.
- Adjust VR4 for best resolution in the viewfinder screen.

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

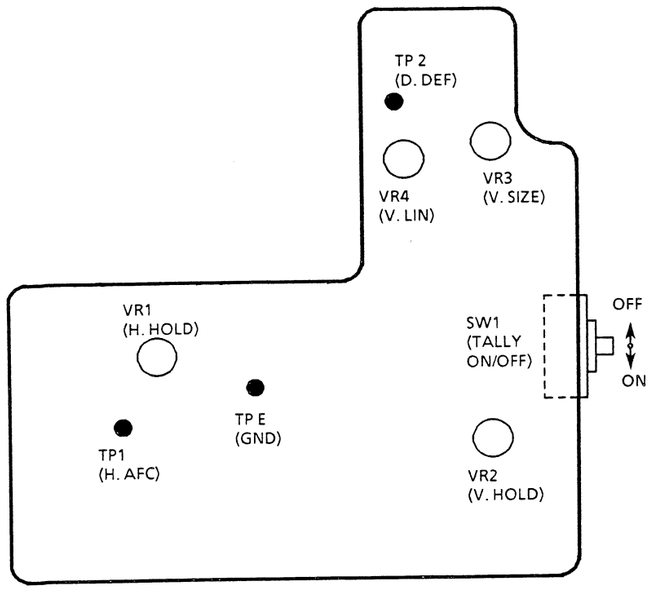
VIDEO AMP BOARD

– Component Side –



DEFLECTION BOARD

– Pattern Side –



CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.

Transistor Number

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

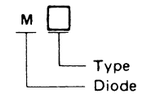
WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

Appearance and Symbols

	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

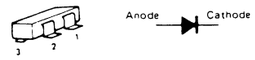
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

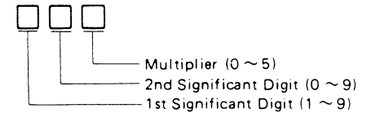
Appearance and Symbols



	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

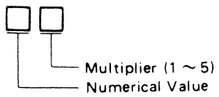
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶	0.5 pF	2.5 ⟶	2.5 pF
75 ⟶	0.75 pF	33 ⟶	33 pF
1 ⟶	1 pF	82 ⟶	82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

A1 ⟶ $10 \times 10^1 = 100$ pF

N2 ⟶ $33 \times 10^2 = 3300$ pF

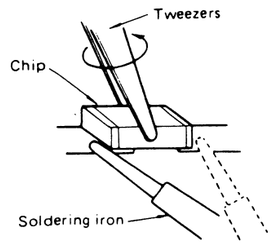
S3 ⟶ $47 \times 10^3 = 47000$ pF

4. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

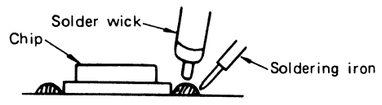
4-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note: Be careful not to damage other chips.

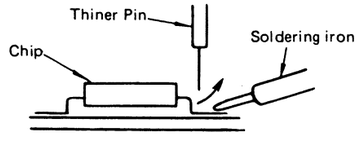


4-2 Removal (IC)

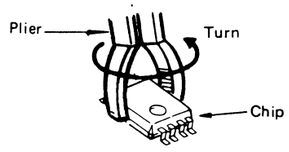
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

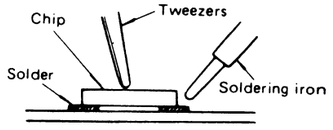


3. Remove IC turning it with plier.

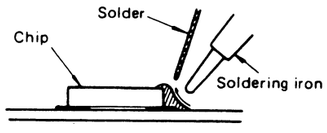


4-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

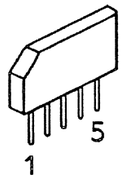


3. Solder both ends of chip (three leads for chip transistor).

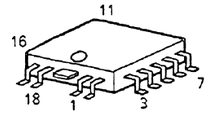


APPEARANCE OF IC, TRANSISTOR AND DIODE

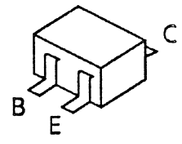
YWM5231TL



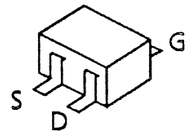
HA11423MPEL



2SD601-RS 2SD814-QRS
2SC2404-CD 2SB709-RS
2SD1478-QR 2SD602-QRS



2SK321-QR



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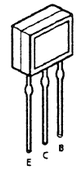

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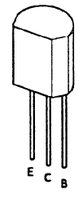

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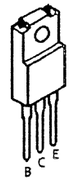
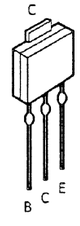
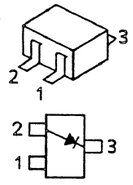


2SD1747A-P



MA151K



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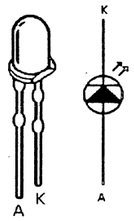
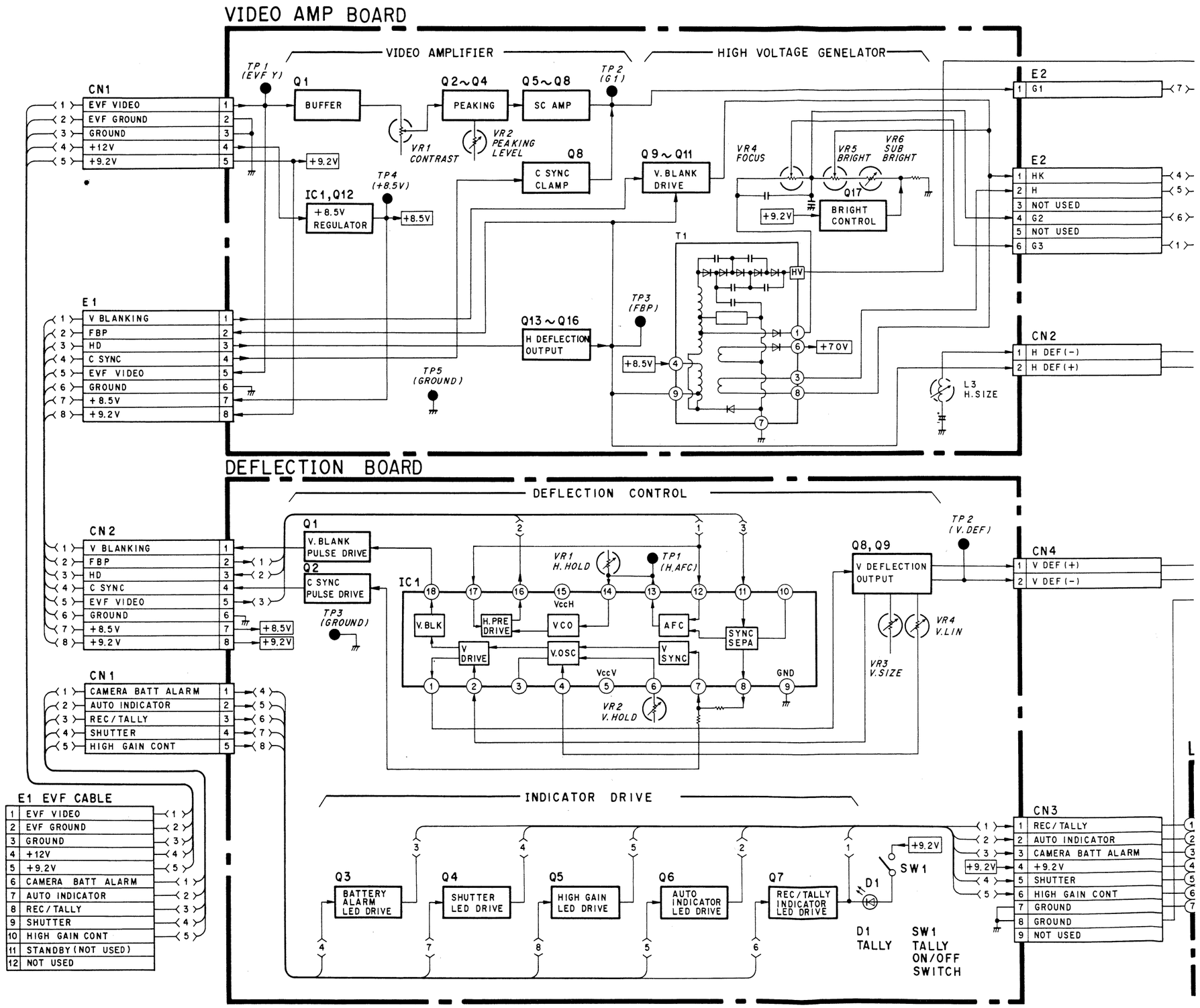
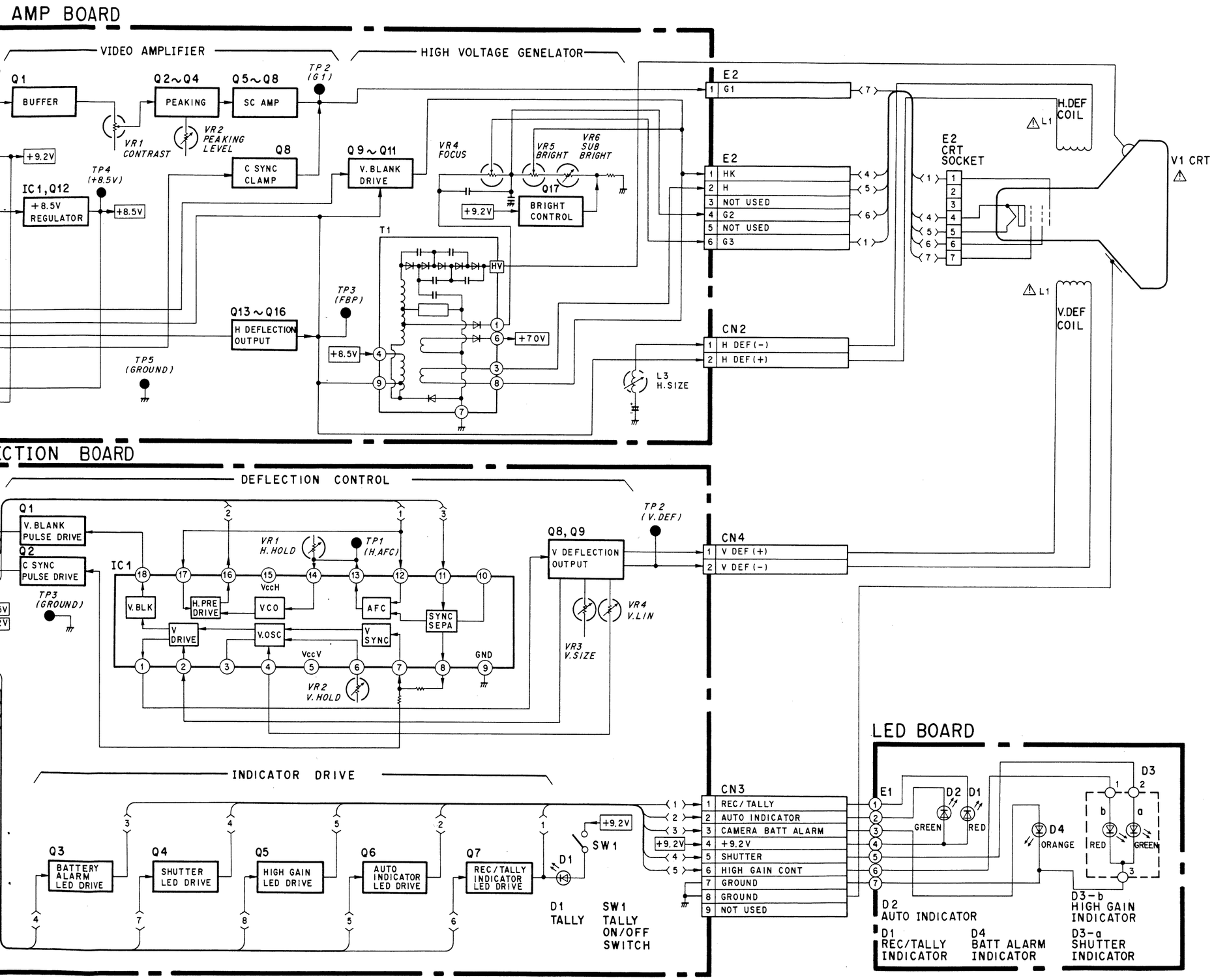


BLOCK DIAGRAM

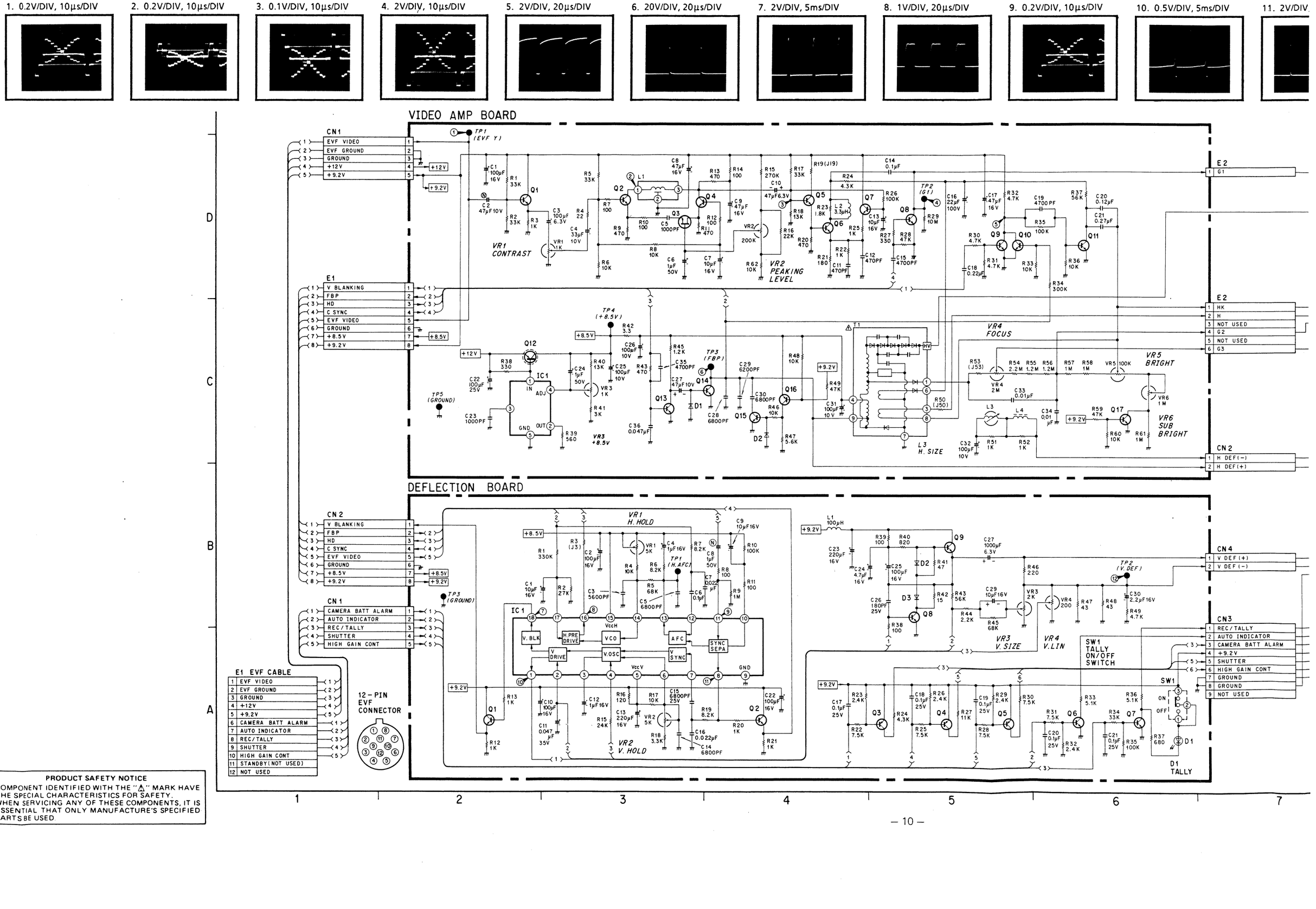


BLOCK DIAGRAM



SCHEMATIC DIAGRAM

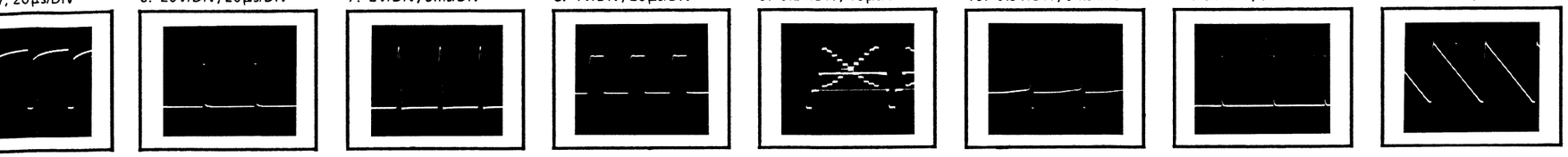
1. 0.2V/DIV, 10μs/DIV
2. 0.2V/DIV, 10μs/DIV
3. 0.1V/DIV, 10μs/DIV
4. 2V/DIV, 10μs/DIV
5. 2V/DIV, 20μs/DIV
6. 20V/DIV, 20μs/DIV
7. 2V/DIV, 5ms/DIV
8. 1V/DIV, 20μs/DIV
9. 0.2V/DIV, 10μs/DIV
10. 0.5V/DIV, 5ms/DIV
11. 2V/DIV

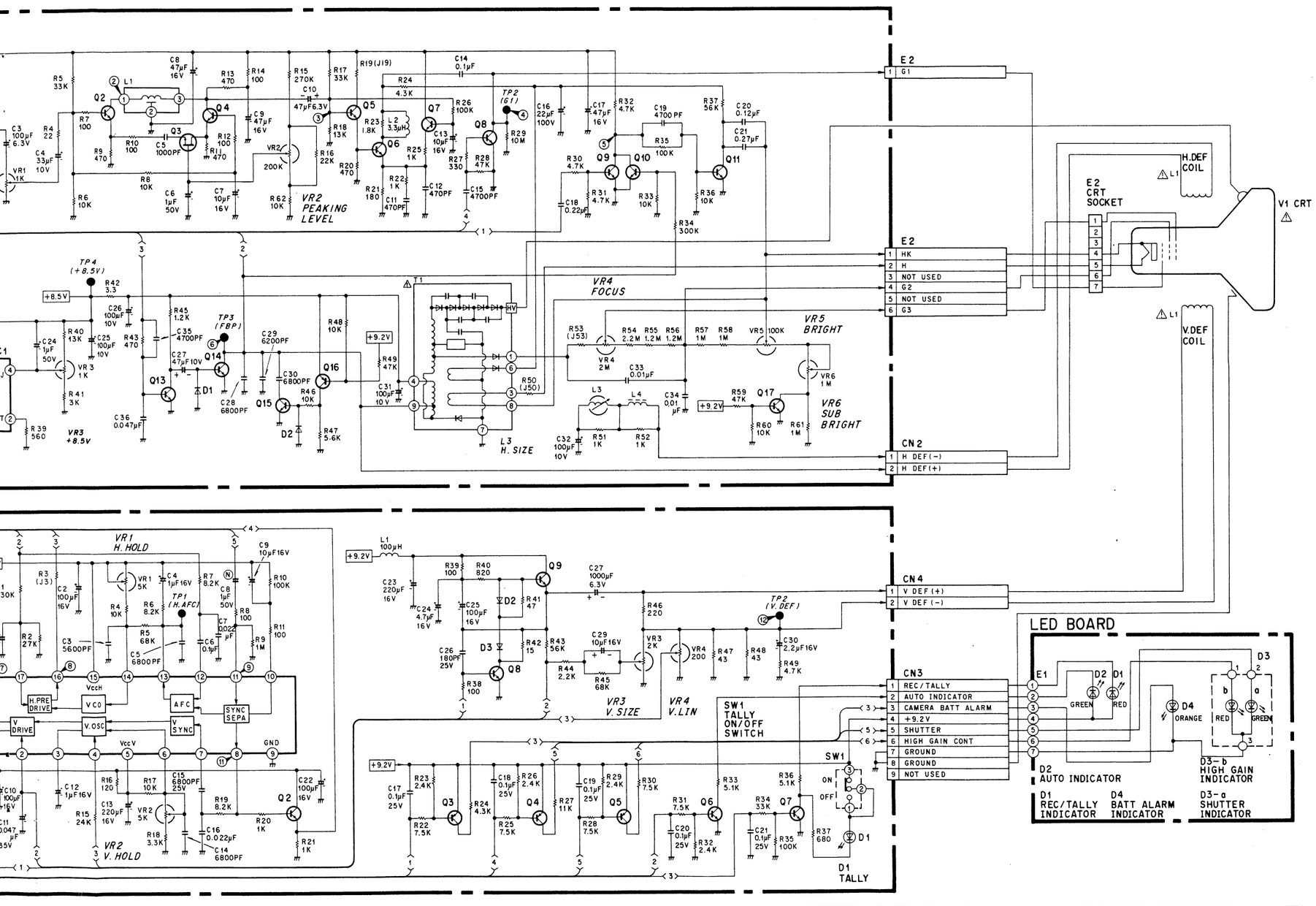


PRODUCT SAFETY NOTICE

COMPONENT IDENTIFIED WITH THE "⚠" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURE'S SPECIFIED PARTS BE USED.

SCHEMATIC DIAGRAM





<ADDRESS INFORMATION>

VIDEO AMP BOARD

Ref No.	Address
IC1	C2
Q1	C2
Q2	C2
Q3	B2
Q4	B2
Q5	B2
Q6	B2
Q7	B2
Q8	B2
Q9	B1
Q10	B1
Q11	B2
Q12	C2
Q13	C2
Q14	C1
Q15	C1
Q16	C1
Q17	C1
D1	C2
D2	C1

DEFLECTION BOARD

Ref No.	Address
IC1	A4
Q1	A4
Q2	A4
Q3	A4
Q4	A4
Q5	A4
Q6	A4
Q7	A4
Q8	B5
Q9	A5
D1	A4
D2	B5
D3	B5

LED BOARD

Ref No.	Address
D1	C5
D2	C4
D3	C5
D4	C5

VIDEO AMP BOARD

<VOLTAGE>

	IC1
Pin 1	11.1
2	0.9
3	2.1
4	1.7
5	0

	B	C	E
Q1	4.3	9.1	3.7
2	1.9	6.0	1.3
3	1.2	0.3	1.1
4	1.8	6.0	1.2
5	2.5	0	1.8
6	0	33.3	1.3
7	2.4	9.1	1.8
8	-4.7	6.1	0
9	0	6.9	0
10	0	0	0
11	-0.3	6.6	0
12	11.1	8.4	11.8
13	0.4	0.9	0
14	0.1	12.7	0
15	0	12.9	0
16	8.0	0	7.8
17	0.6	0	0

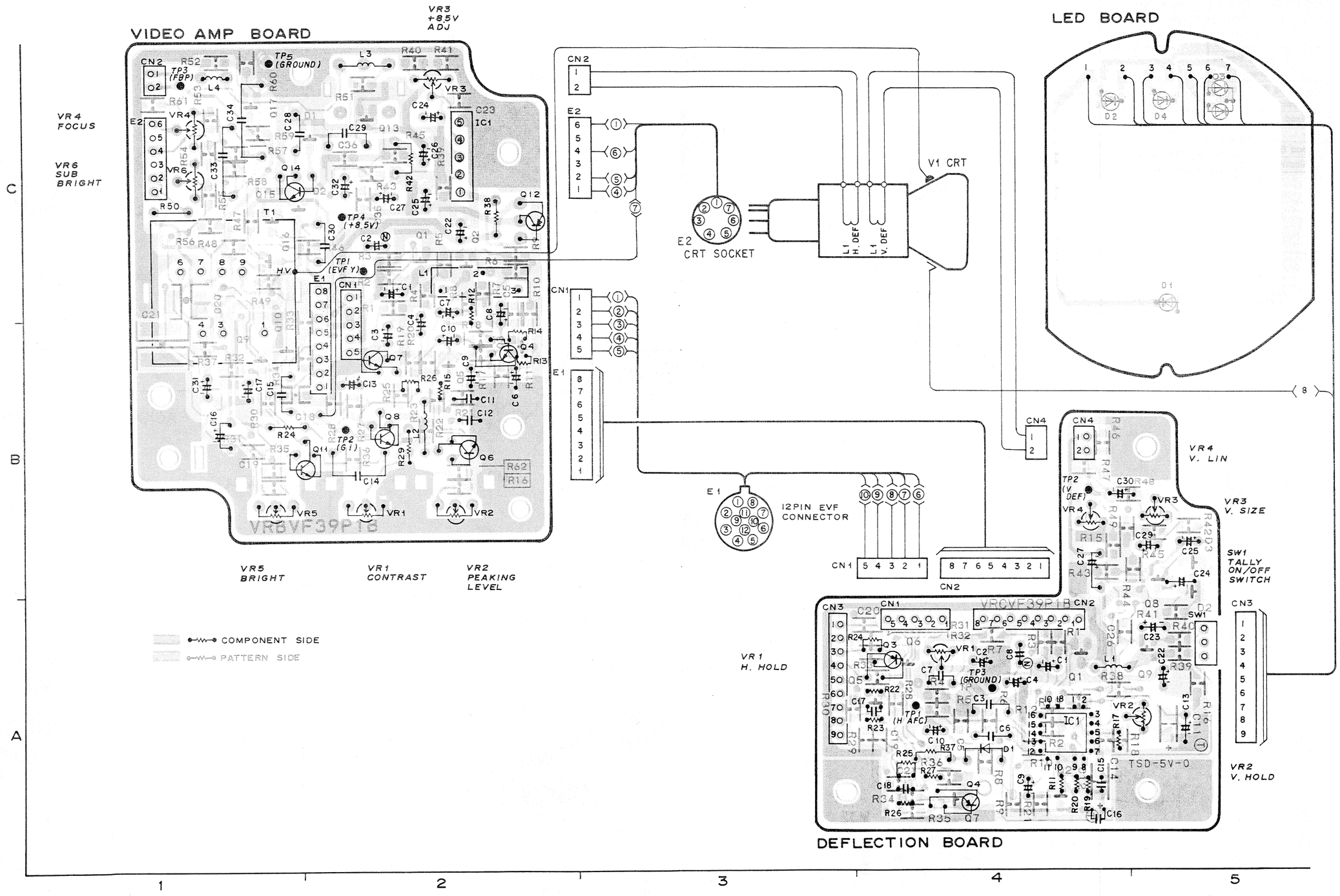
DEFLECTION BOARD

<VOLTAGE>

	B	C	E
Q1	0.4	9.1	0.1
2	0.8	9.1	0.6
3	9.1	0	9.1
4	9.1	0	9.1
5	9.1	0	9.1
6	0	7.5	0
7	0	7.8	0
8	0.5	4.5	0
9	5.3	9.1	4.9

	IC1
Pin 1	0.6
2	2.7
3	4.8
4	2.7
5	8.3
6	2.9
7	2.0
8	0.8
9	0
10	2.1
11	1.8
12	2.2
13	4.3
14	4.4
15	8.4
16	1.0
17	0.5
18	0.4

CONDUCTOR VIEW



<ADDRESS INFORMATION>

VIDEO AMP BOARD

Ref No.	Address
IC1	C2
Q1	D2
Q2	D3
Q3	D3
Q4	D3
Q5	D4
Q6	D4
Q7	D4
Q8	D5
Q9	D5
Q10	D5
Q11	D6
Q12	C2
Q13	C3
Q14	C4
Q15	C4
Q16	C4
Q17	C6
D1	C3
D2	C4

DEFLECTION BOARD

Ref No.	Address
IC1	A3
Q1	A2
Q2	A4
Q3	A5
Q4	A5
Q5	A5
Q6	A6
Q7	A6
Q8	B5
Q9	B5
D1	A6
D2	B5
D3	B5

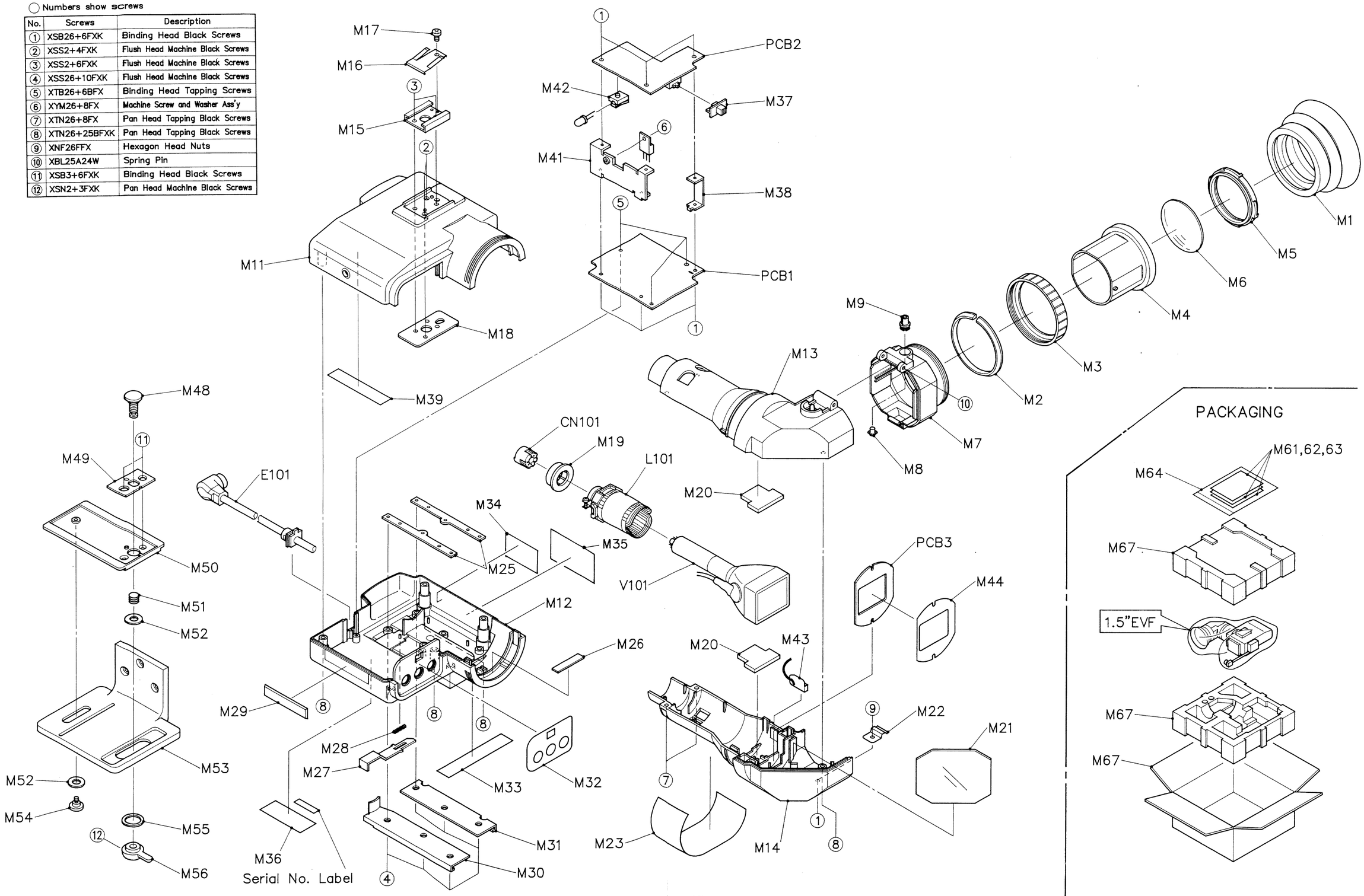
LED BOARD

Ref No.	Address
D1	A8
D2	A7
D3	A8
D4	A8

EXPLODED VIEW

◯ Numbers show screws

No.	Screws	Description
①	XSB26+6FXK	Binding Head Black Screws
②	XSS2+4FXK	Flush Head Machine Black Screws
③	XSS2+6FXK	Flush Head Machine Black Screws
④	XSS26+10FXK	Flush Head Machine Black Screws
⑤	XTB26+6BFX	Binding Head Tapping Screws
⑥	XYM26+8FX	Machine Screw and Washer Ass'y
⑦	XTN26+8FX	Pan Head Tapping Black Screws
⑧	XTN26+25BFXK	Pan Head Tapping Black Screws
⑨	XNF26FFX	Hexagon Head Nuts
⑩	XBL25A24W	Spring Pin
⑪	XSB3+6FXK	Binding Head Black Screws
⑫	XSN2+3FXK	Pan Head Machine Black Screws



REPLACEMENT PARTS LIST

Important Notice

1. Components identified by "⚠" mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION
MISCELLANEOUS		
V101 ⚠	40LB4	Cathode Ray Tube
L101 ⚠	ELY15V205D	Deflection Coil
E101	YWEB202J610	EVF Cable Assy
M1	YWV5GA0094A3	Cap
M2	YWV3FA0123A4	Stopper Ring
M3	YWV3FA0124A3	Ring
M4	YWV3FA0125A3	Lens Inner Case
M5	YWV3FA0126A3	Lens Holder Ring
M6	YWV1VA0024A4	Lens
M7	YWV5KA1026A2	Case
M8	YWV6DA0021A4	Fastener
M9	YWV3CA0213A3	Parts Holder
M11	YWV5EA0862A1	EVF Upper Cover
M12	YWV5EA0863A1	EVF Bottom Cover
M13	YWV5EA0864A1	CRT Upper Cover
M14	YWV5EA0865A1	CRT Bottom Cover
M15	YFV5MA0002B4	Shoe
M16	YWFAC17XWB1	Spring D
M17	YWFAC17XFM2	Special Screw
M18	YWV1FA0057A4	Nut
M19	YFV2FA0014A4	Cushion A for Neck Rubber
M20	YFV2FA0049B4	Cushion B for CRT Cover
M21	YWV1UA0016A4	Mirror
M22	YWV4JA0321A4	Spring B
M23	YWV2PA0400A4	Insulator Sheet
M25	YWV2TA0087A4	Mounting Bracket
M26	YWV4JA0322A4	Spring C
M27	YWV4RA0090A4	Lever
M28	YWV4JA0151A4	Spring A
M29	YFNA326PB-9	Badge
M30	YWV2EA0053A4	Shoe Guide A
M31	YWV2EA0054A4	Shoe Guide B
M32	YWV7QA2237A4	Indicator Label
M33	YFV7MA0099A4	UL Caution Label
M34	YWV7MA0358A4	Serviceman Caution Label
M35	YWS-XEGRB03AA4	X-Ray Label
M36 ⚠	YWV7QA2276A4	Main Label
M37	YWV5RA0249A4	Knob
M38	YWV2SA1651A4	Mounting Angle
M39	YWS-WULRB03	Caution Label
M48	YWV2JA0014A4	Bracing Strut
M49	YWV4RA0019A4	Lever
M50	YWV6GA0057A3	Plate
M51	YWV4JA0148B4	Spring
M52	YWV1KA0039A4	Washer
M53	YWV6FA0064A2	Bracket
M54	YWV1EA0074A4	Special Screw
M55	YWV1KA0040A4	Washer
M56	YWV5RA0077A4	Knob

REF.NO.	PART NO.	DESCRIPTION	
VIDEO AMP BOARD			
PCB1 (NLA)	YWVKBVF39P1A	Printed Circuit Board Assy	
IC1	YWM5231TL	IC	
Q1,2	2SD601-RS	Transistor	
Q3	2SK321-QR	FET	
Q4,5	2SD601-RS	Transistor	
Q6,7	2SC2784-FE	Transistor	
Q8	2SC641K-C	Transistor	
Q9,10	2SC2404-CD	Transistor	
Q11	2SC2784-FE	Transistor	
Q12	2SB941-PQ	Transistor	
Q13	2SD601-RS	Transistor	
Q14	2SD1747A-P	Transistor	
Q15	2SD814-QRS	Transistor	
Q16	2SB709-RS	Transistor	
Q17	2SD601-RS	Transistor	
D1,2	MA151K	Diode	
R1,2	YF2116333GT	Carbon	33K ohms 1/16W
R3	YF2116102GT	Carbon	1K ohms 1/16W
R4	YF2116220JT	Carbon	22 ohms 1/16W
R5	YF2116333GT	Carbon	33K ohms 1/16W
R6	YF2116103JT	Carbon	10K ohms 1/16W
R7	YF2116101JT	Carbon	100 ohms 1/16W
R8	YF2116103JT	Carbon	10K ohms 1/16W
R9	YF2116471JT	Carbon	470 ohms 1/16W
R10	YF2116101JT	Carbon	100 ohms 1/16W
R11	YF2116471JT	Carbon	470 ohms 1/16W
R12	YF2116101JT	Carbon	100 ohms 1/16W
R13	YF2116471JT	Carbon	470 ohms 1/16W
R14	YF2116101JT	Carbon	100 ohms 1/16W
R15	YW2116274GT	Carbon	270K ohms 1/16W
R16	YF2116223GT	Carbon	22K ohms 1/16W
R17	YF2116333GT	Carbon	33K ohms 1/16W
R18	YF2116133GT	Carbon	13K ohms 1/16W
R20	YF2116471JT	Carbon	470 ohms 1/16W
R21	YF2116181JT	Carbon	180 ohms 1/16W
R22	YF2116102GT	Carbon	1K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R23	YW2116182JT	Carbon 1.8K ohms 1/16W
R24	ERDS2TJ432	Carbon 4.3K ohms 1/4W
R25	YF2116102GT	Carbon 1K ohms 1/16W
R26	YF2116104JT	Carbon 100K ohms 1/16W
R27	YF2116331JT	Carbon 330 ohms 1/16W
R28	YF2116473GT	Carbon 47K ohms 1/16W
R29	ERC14GJ106X	Solid Resistor 10M ohms
R30-132	YF2116472GT	Carbon 4.7K ohms 1/16W
R33	YF2116103JT	Carbon 10K ohms 1/16W
R34	YF2116304JT	Carbon 300K ohms 1/16W
R35	YF2116104JT	Carbon 100K ohms 1/16W
R36	YF2116103JT	Carbon 10K ohms 1/16W
R37	YF2116563JT	Carbon 56K ohms 1/16W
R38	ERDS2FJ331	Carbon 330 ohms 1/4W
R39	YF2116561JT	Carbon 560 ohms 1/16W
R40	YF2116133GT	Carbon 13K ohms 1/16W
R41	YF2116302GT	Carbon 3K ohms 1/16W
R42	ERDS2TJ3R3	Carbon 3.3 ohms 1/4W
R43	YF2116471JT	Carbon 470 ohms 1/16W
R45	YF2116122JT	Carbon 1.2K ohms 1/16W
R46	YF2116103JT	Carbon 10K ohms 1/16W
R47	YF2116562JT	Carbon 5.6K ohms 1/16W
R48	YF2116103JT	Carbon 10K ohms 1/16W
R49	YF2116473GT	Carbon 47K ohms 1/16W
R51,52	YF2116102GT	Carbon 1K ohms 1/16W
R54	YW2116225GT	Carbon 2.2M ohms 1/16W
R55,56	YF2116125GT	Carbon 1.2M ohms 1/16W
R57,58	YF2116105GT	Carbon 1M ohms 1/16W
R59	YF2116473GT	Carbon 47K ohms 1/16W
R60	YF2116103JT	Carbon 10K ohms 1/16W
R61	YF2116105GT	Carbon 1M ohms 1/16W
R162	YF2116103GT	Carbon 10K ohms 1/16W
VR1	RK09KA001KB1	Variable Resistor 1K ohms
VR2	RK09KA200KB1	Variable Resistor 200K ohms
VR3	PK502H102H0A	Variable Resistor 1K ohms
VR4	PK502H205H0A	Variable Resistor 2M ohms
VR5	RK09KA100KB1	Variable Resistor 100K ohms
VR6	PK502H105H0A	Variable Resistor 1M ohms
C1	ECEA1CKA101	Electrolytic 100 µF 16V
C2	ECEA1AKN470	Electrolytic 47 µF 10V
C3	ECEA0JKS101	Electrolytic 100 µF 6.3V
C4	ECEA1AKS330	Electrolytic 33 µF 10V (KA)
C5	YW400102CHJT	Ceramic 1000 pF
C6	ECEA1HKK010	Electrolytic 1 µF 50V
C7	ECEA1CKK100	Electrolytic 10 µF 16V
C8,9	ECEA1CKS470	Electrolytic 47 µF 16V
C10	ECEA0JKS470	Electrolytic 47 µF 6.3V (KA)
C11,12	YF400471CHJT	Ceramic 470 pF
C13	ECEA1CKK100	Electrolytic 10 µF 16V
C14	ECQE1104KZ	Plastic 0.1 µF
C15	ECQP1H472GZ	Plastic 4700 pF 50V
C16	ECEA2AU220	Electrolytic 22 µF 100V
C17	ECEA1CKS470	Electrolytic 47 µF 16V
C18	YF426224FZS	Ceramic 0.22 µF 50V
C19	YF400472XKT	Ceramic 4700 pF

REF.NO.	PART NO.	DESCRIPTION
C20	YW43B124K100	Ceramic 0.12 µF
C21	YW46B274K100	Ceramic 0.27 µF
C22	ECEA1EU101	Electrolytic 100 µF 25V (SU)
C23	YF400102XKT	Ceramic 1000 pF
C24	ECEA1HKK010	Electrolytic 1 µF 50V
C25,26	ECEA1AKA101	Electrolytic 100 µF 10V
C27	ECEA1AKS470	Electrolytic 47 µF 10V
C28	ECQP1682GZ	Plastic 6800 pF 100V
C29	ECQP1622GZ	Plastic 6200 pF 100V
C30	ECQP1682GZ	Plastic 6800 pF
C31	ECEA1AFS101	Electrolytic 100 µF 10V
C32	ECEA1AKA101	Electrolytic 100 µF 10V
C33	1510E103Z1K	Ceramic 0.01 µF
C34	ECQE4103JZ	Plastic 0.01 µF
C35	YF400472XKT	Ceramic 4700 pF
C36	YW400473XK	Ceramic 0.047 µF
L1	ELB4K075	Delay Line
L2	ELEPH330JA	Coil 33 µH
L3	EIR1QE028B	Coil
L4	ELH5L322	Coil
T101 ⚠	YWHIPAKVF39A	Flyback Transformer
J119	YF21160R00T	Jamper Resistor
J150	ERDS2TC0	Jamper Resistor
J153	YF21160R00T	Jamper Resistor
CN1	EMCS0550Z	5-pin Connector
CN2	EMCS0250Z	2-pin Connector
CN101	YWS7518N620	CRT Socket
TP1	YW32BM10	Test-pin
M41	YWV7DA0266A4	Heat Sink

DEFLECTION BOARD

PCB2 (NLA)	YWVKCVF39P1A	Printed Circuit Board Assy
IC1	HA11423MPEL	IC
Q1,2	2SD601-RS	Transistor
Q3-5	2SB709-RS	Transistor
Q6	2SD601-RS	Transistor
Q7	2SD1478-QR	Transistor
Q8,9	2SD602-QRS	Transistor
D1	YWGL5UR2K1	LED
D2,3	MA151K	Diode
R1	YF2116334JT	Carbon 330K1/16W
R2	YF2116273GT	Carbon 27K ohms 1/16W
R4	YF2116103JT	Carbon 10K ohms 1/16W
R5	YF2116683GT	Carbon 68K ohms 1/16W
R6	YW2116822GT	Carbon 8.2K ohms 1/16W
R7	YF2116822JT	Carbon 8.2K ohms 1/16W
R8	YF2116101JT	Carbon 100 ohms 1/16W
R9	YW2116105JT	Carbon 1M ohms 1/16W
R10	YF2116104JT	Carbon 100Kohms 1/16W
R11	YF2116101JT	Carbon 100 ohms 1/16W
R12,13	YF2116102GT	Carbon 1K ohms 1/16W
R15	YF2116243JT	Carbon 24K ohms 1/16WF

REF.NO.	PART NO.	DESCRIPTION
R16	YF211612 1JT	Carbon 120 ohms 1/16W
R17	YF211610 3JT	Carbon 10K ohms 1/16W
R18	YF211633 2JT	Carbon 3.3K ohms 1/16W
R19	YF211682 2JT	Carbon 8.2K ohms 1/16W
R20,21	YF211610 2GT	Carbon 1K ohms 1/16W
R22	YF211675 2JT	Carbon 7.5K ohms 1/16W
R23	YW211624 2JT	Carbon 2.4K ohms 1/16W
R24	YF211643 2JT	Carbon 4.3K ohms 1/16W
R25	YF211675 2JT	Carbon 7.5K ohms 1/16W
R26	YW211624 2JT	Carbon 2.4K ohms 1/16W
R27	YF211611 3JT	Carbon 11K ohms 1/16W
R28	YF211675 2JT	Carbon 7.5K ohms 1/16W
R29	YW211624 2JT	Carbon 2.4K ohms 1/16W
R30,31	YF211675 2JT	Carbon 7.5K ohms 1/16W
R32	YW211624 2JT	Carbon 2.4K ohms 1/16W
R33	YF211651 2JT	Carbon 5.1K ohms 1/16W
R34	YF211633 3GT	Carbon 33K ohms 1/16W
R35	YF211610 4JT	Carbon 100K ohms 1/16W
R36	YF211651 2JT	Carbon 5.1K ohms 1/16W
R37	ERDS2TJ681	Carbon 680 ohms 1/4W
R38,39	YF211610 1JT	Carbon 100 ohms 1/16W
R40	YF211682 1GT	Carbon 820 ohms 1/16W
R41	YF211647 0JT	Carbon 47 ohms 1/16W
R42	211615 0JT	Carbon 15 ohms 1/16W
R43	YF211656 3JT	Carbon 56K ohms 1/16W
R44	YF211622 2GT	Carbon 2.2K ohms 1/16W
R45	YF211668 3GT	Carbon 68K ohms 1/16W
R46	YF211622 1JT	Carbon 220 ohms 1/16W
R47,48	YW211643 0JT	Carbon 43 ohms 1/16W
R49	YF211647 2GT	Carbon 4.7K ohms 1/16W
VR1,2	EVML3GA00B53	Variable Resistor 5KB ohms
VR3	EVML3GA00B23	Variable Resistor 2KB ohms
VR4	EVML3GA00B22	Variable Resistor 200 ohms
C1	ECEA1CKK100	Electrolytic 10 µF 16V
C2	ECEA1CKA101	Electrolytic 100 µF 16V
C3	ECQP1H562JZ	Plastic 5600 pF 50V
C4	ECSF1CE105	Electrolytic 1 µF 16V
C5	YF400682XKT	Ceramic 6800 pF
C6	ECQV1H104JZ	Plastic 0.1 µF 50V
C7	ECQM1H223JZ	Plastic 0.022 µF 50V
C08	ECEA1HK010	Electrolytic 1 µF 50V
C09	ECEA1CKK100	Electrolytic 10 µF 16V
C10	ECEA1CKA101	Electrolytic 100 µF 16V
C11	ECST1VY473	Electrolytic 0.047 µF 35V
C12	ECST1CY105ZR	Electrolytic 1 µF 16V
C13	ECEA1CSS221	Electrolytic 220 µF 16V
C14,15	YF400682XKT	Ceramic 6800 pF
C16	YF400223XKT	Ceramic 0.022 µF
C17-21	YF400104FZT	Ceramic 0.1 µF
C22	ECEA1CKA101	Electrolytic 100 µF 16V
C23	ECEA1CSS221	Electrolytic 220 µF 16V
C24	ECST1CB475ZR	Electrolytic 4.7 µF16V
C25	ECEA1CKA101	Electrolytic 100 µF 16V
C26	YF400181CHJT	Ceramic 180 pF
C27	ECEA0JU102	Electrolytic 1000 µF 6.3V

REF.NO.	PART NO.	DESCRIPTION
C29	ECEA1CKK100	Electrolytic 10 µF 16V
C30	ECST1CX225	Electrolytic 2.2 µF 16V
L1	ELC08D056	Coil
SW1	YWSSS912L2NH	Slide Switch
J3	YF21160R00T	Jumper Resistor
CN1	EMCS0550Z	5-pin Connector
CN2	EMCS0850Z	8-pin Connector
CN3	EMCS0950Z	9-pin Connector
CN4	EMCS0250Z	2-pin Connector
TP1	YW32BM10	Terminal
M42	YWA3CA0052A4	Parts Holder

LED BOARD

PCB3	YWVRZVF39P1A	Printed Board
D301	SLM13VW	LED
D302	SLM13MW	LED
D303	SLM23VMW	LED
D304	SLM13DW	LED
M43	YWV4JA0230A4	Spring
M44	YWV7QA2236A4	Main Label

ACCESSORY PARTS/PACKAGING PARTS

M61	YWV8QA2172AN	Operating Instructions
M64	YWT20X25C03	Polyethylene Bag
M65	XZB26X40C05	Polyethylene Bag
M67	YWV9CA1476AN	Packaging Assy